Question2

Solution :

Just play as this:

$$When\ opponent\ throw\ Rock \begin{cases} If\ I\ have\ Paper, throw\ Paper \\ If\ I\ don'thave\ Paper, throw\ Rock \\ If\ I\ don't\ have\ Rock\ and\ Paper, throw\ Scissors \end{cases}$$

Then,

$$When\ opponent\ throw\ Paper \begin{cases} If\ I\ have\ Scissors, throw\ Scissors \\ If\ I\ don'thave\ Scissors, throw\ Paper \\ If\ I\ don't\ have\ Scissors\ and\ Paper, throw\ Rock \end{cases}$$

At last,

$$When\ opponent\ throw\ Scissors \begin{cases} If\ I\ have\ Rock, throw\ Rock \\ If\ I\ don'thave\ Rock, throw\ Scissors \\ If\ I\ don't\ have\ Scissors\ and\ Rock, throw\ Paper \end{cases}$$

We can get the maximum number of points in this way.

Proof :

Because of $R_a + P_a + S_a = R_b + P_b + S_b = N$.

So the maximum times that I can win is $win\_times = min(R_a, P_b) + min(P_a, S_b) + min(S_a, R_b)$.

After that , I need to prevent losing scores so I have to try to draw with opponent. Let's compute these:

$$R'_a = R_a - \min(R_a, P_b);\ P'_a = P_a - \min(P_a, S_b);\ S'_a = S_a - \min(S_a, R_b)$$

$$R'_b = R_b - \min(S_a, R_b);\ P'_b = P_b - \min(R_a, P_b);\ S'_b = S_b - \min(P_a, S_b)$$

So the maximum times that I can draw is $draw\_times = min(R'_a, R'_b) + min(P'_a, P'_b) + min(S'_a, S'_b)$.

At last the minimum times that I have to lose is $lost\_times = N - win\_times - draw\_times$.

The maximum number of points is $max\_point = 2 \times win\_times + draw\_times - N$